Journal of the Society of Arts.

FRIDAY, OCTOBER 16, 1868.

Announcements by the Council.

EXAMINATIONS, 1869.

The Programme of Examinations for 1869 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

SUBSCRIPTIONS.

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Proceedings of Institutions.

SALFORD WORKING MEN'S COLLEGE.—The annual distribution of prizes and certificates to the students of the Working Men's College was made on Wednesday evening, the 30th September, in the lecture-hall of the college, by Mr. William Fairbairn, L.L.D., F.R.S. There was a large attendance, amongst those present being Alderman Wright Turner (in the chair), Dr. J. Watts, Mr. Colin Mather, Mr. W. J. Traice, &c. After an address by the chairman, Mr. Plant, hon. secretary, observed that he had only to say, generally, that the college was in a very sound and healthy state. From the elementary schools held in the day time to the classes held in the evening, there were evidences of a sound and healthy condition. During the past session some of the classes had been distinguishing themselves more in their energies and in results obtained than was ever known before. Mr. Fairbairn then delivered the certificates and prizes to the students, accompanying each presentation with encouraging remarks. Two of the recipients were apprentices in the employment of Messrs. Mather and Plant, and Mr. Plant stated that the firm had further recognised their industry by presenting each with a handsome box of instruments. Mr. Fairbairn then addressed the assembly, and in the course of his remarks he said that we must take care that our system of education was a safe one, that it was well grounded, and that it was likely to lead to results calculated to improve the mind, enlarge the intellect, and make us better men. Much had been said and much had been written on what was called technical education, or that sort of knowledge which appertains to that college or to men who had entered upon their professional pursuits and were actively engaged in the affairs of life. In the consideration of that question—which was a very important one—they must first ascertain what process was necessary to prepare them for the reception of first principles, and those natural laws on which every trade and every profession was founded. To receive these principles and to benefit by them, they must first have the rudiments, or that elementary training which would fit them for a higher class of instruction. They must first learn to read and write, and they must have a knowledge of figures before they could exercise the faculties of a mathematician or a man of science. As well might they expect a luxuriant crop from a field that was barren as look for results in a working man's college where the members were deficient in the ordinary elements of primary instruction. A vote of thanks to Mr. Fairbairn was then moved by Mr. Somers, seconded by Mr. Traice, supported by the Rev. T. A. Stowell and Mr. Colin Mather, and passed by acclamation. Dr. Watts, Mr. Moriau (French teacher), and Mr. Le Resche (teacher of drawing) then addressed the meeting, which concluded by a vote of thanks to the chairman.

EXAMINATION PAPERS, 1868.

(*Continued from page* 781.)

The following are the Examination Papers set in the various subjects at the Final Examination held in April last:—

ITALIAN.

(THREE HOURS ALLOWED.)

I.

Candidates for a first-class certificate must translate the following passages (poetry and prose), and answer any grammatical questions annexed to them:—

Polifonte. Chiaro mi narra
E narra il ver, come tu mai giungessi
A eccesso tanto. Ove a sperar ti avanzi
Più nulla omai, se ingenuo parli, spera.
Egisto. In altra guisa io non saprei: menzogna
Del mio libero stato non è l'arte.—
Io m'era al vecchio genitor di furto
Sottratto, incauto! e già più mesi attorno
Men giva errando per città diverse,
Quand' oggi al fin qui m'avviava. Un calle
Stretto e solingo, che ai pedon dà via
Lungo il Pamiso, con veloci piante
Venìa calcando, impaziente molto
Di porre il piè nella città, che mostra
Mi fea da lungi vaga, e in un pomposa,
D' alti palagi e di superbe torri.
Quand' ecco, a me di contro altr' uom venirne,
Più frettoloso assai: son d' uom che fugge
I passi suoi; giovin l' aspetto; gli atti,
Arroganti, assoluti: ei di lontano
Con man mi accenna ch' io gli sgombri il passo.
Angustissimo il loco, ad uno appena
Adito dà: sul fiume alto scoscende
Il mal sentier per una parte; l'altra,
Irta d'ispidi dumi, assai fa schivo
D'accostarvisi l'uomo. Il modo spiacque
A me, libero nato, uso soltanto
D'obbedire alle leggi; a ceder solo
Ai più vecchi di me: m'inoltro io quindi.
Ei, con voce terribile; "Ritratti,
O ch'io . . . ." mi grida. Ardo di sdegno allora:
"Ritratti tu" gli replico. Già presso
Siam giunti: ei caccia un suo pugnal dal fianco,
E su me corre: io non avea pugnale,
Ma cor; lo aspetto di piè fermo; ei giunge;
Io sottentro, il ricingo, e, in men che il dico,
L'atterro: invan dibattesi; il confiecco
Con mie ginocchia al suol: sua destra afferro
Con ambe mani; ei freme indarno, io salda
Glie la rattengo, immota. Quando ei troppo
Debil si scorge al paragone, a finta
Mercede viene; io il credo, il lascio; ei tosto
A tradimento un colpo, qual qui vedi,
Mi vibra; i panni squarcia; il colpo striscia;
Lieve è il dolor, ma troppa l'ira: io cieco,
Di man gli strappo il rio pugnal . . . . trafitto
Nel sangue ei giace.

(ALFIERI, Merope.)

GRAMMATICAL NOTES.

1. *Saprei:* Write the whole of the imperative of this verb.

2. *Eccesso tanto:* What is to be understood by *tanto* in this case?

3. *Men:* Give the complete and separate form of these pronouns and their literal meaning.

4. *Giva:* What are the other two synonymous verbs of this?

5. *Venìa:* Write the future of this verb.

6. *Fea:* What is the complete form of this?

7. *Ei:* How could this pronoun be otherwise variously rendered?

8. *Atterro:* Give the infinitive.

9. *Scorge:* Give the whole of the preterite tense and the participle past.

10. *Finta:* Give the infinitive.

II.

Io vi mando un presente, il quale, se non corrisponde agli obblighi che io ho con voi, è tale senza dubbio, quale ha potuto Niccolò Machiavelli mandarvi maggiore. Perchè in quello io ho espresso quanto io so, e quanto io ho imparato per una lunga pratica e continua lezione delle cose del mondo. E non potendo nè voi nè altri desiderare da me più, non vi potete dolere se io non vi po donato più. Bene vi può increscere della povertà dello ingegno mio, quando siano queste mie narrazioni hovere; e della fallacia del giudizio, quando io in molte parti discorrendo m'inganni. Il che essendo, non so quale di noi si abbia ad esser meno obbligato all' altro, o io a voi che mi avete forzato a scrivere quello ch'io mai per me medesimo non avrei scritto, o voi a me, quando scrivendo non v' abbia soddisfatto. Pigliate adunque questo in quel modo che si pigliano tutte le cose degli amici, dove si considera più sempre l'intenzione di chi manda, che la qualità della cosa che è mandata. . . . . .

(Machiavelli, Dedication of his *Discorsi*.)

III.

Translate freely into Italian:—

There are two very natural propensities which we may distinguish in the most virtuous and liberal dispositions, the love of pleasure and the love of action. If the former be refined by art and learning, improved by the charms of social intercourse, and corrected by a just regard to economy, to health, and to reputation, it is productive of the greatest part of the happiness of private life. The love of action is a principle of a much stronger and more doubtful nature. It often leads to anger, to ambition, and to revenge; but when it is guided by the sense of propriety and benevolence, it becomes the parent of every virtue; and if those virtues are accompanied with equal abilities, a family, a state, or an empire, may be indebted for their safety and prosperity to the undaunted courage of a single man. To the love of pleasure we may therefore ascribe most of the agreeable, to the love of action we may attribute most of the useful and respectable qualifications. The character in which both the one and the other should be united and harmonised would seem to constitute the most perfect idea of human nature. The insensible and inactive disposition, which should be supposed alike destitute of both, would be rejected, by the common consent of mankind, as utterly incapable of procuring any happiness to the individual or any public benefit to the world.

Gibbon, *Decline and Fall of the Roman Empire*.)

IV.

FAMILIAR IDIOMS.

(To be rendered by their English equivalents.)

Egli mi supera di gran lunga.
Qui ci va dell'onore.
Punger sul vivo.
Adesso adesso capiterà colui.
Se ci convenisse tornar da capo.
Fai sempre lo svogliato.
Un ritratto grande al vero.
Il poveretto è spacciato.
Si spaccia per amico nostro.
Cotesta mercanzia non si spaccia.
Non so se n'uscirete senza scapito.
Buon pro vi faccia.

Candidates for second or third-class certificates must (1) translate into English the following extracts, and (2) answer the grammatical questions given below:—

Gioas. Or che re sono,
Sarà degno del trono anche il cor mio:
Non sta il cor de' regnanti in man di Dio?
Giojada. Si; tel dissi, e mi piace
Che il rammenti o Gioas; ma spesso ancora
Cercando ad arte occasïon, t' esposi
I doveri d'un re: questo è il momento
Di ripeterli, o figlio. Oggi d'un regno
Dio ti fa don; ma del suo dono un giorno
Ragion ti chiederà. Tremane; e questo
Durissimo giudizio, a cui t' esponi,
Sempre in mente ti stia. Comincia il regno
Da te medesmo. I desiderj tuoi
Siano i primi vassalli, onde i soggetti
Abbiano in chi commanda
L'esempio d'ubbidir. Sia quel che dèi,
Non quel che puoi, dell' opre tue misura,
Il publico procura
Più che il tuo ben. Fa che in te s'ami il padre,
Non si tema il tiranno. È de' regnanti
Mal sicuro custode
L' altrui timore, e non si svelle a forza
L' amore altrui. Premii dispensa e pene
Con esatta ragion. Tardo risolvi;
Sollecito eseguisci. E non fidarti
Di lingua adulatrice
Con vile assenso a lusingarti intesa;
Ma porta in ogni impresa
La prudenza per guida,
Per compagno il valore,
La giustizia sugli occhi, e Dio nel core.
Tu compir così procura
Quanto lice ad un mortale;
E poi fidati alla cura
Dell' eterno condottier.
Con vigore al peso eguale
L' alme Iddio conferma e regge,
Che fra l' altre in terra elegge
Le sue veci a sostener.

(Metastasio, Gioas, Re di Giuda.)

II.

Queste mie sono lettere d' uomo esule, il quale scrivendo per ozio agli amici suoi intorno alla nazione a cui rifuggì, ripensava pur tanto alla patria, che gli vennero fatti de' paragoni fra l'Inghilterra e l' Italia.

E tu pure guardane alcune per ozio; e non leggere un po' seriamente fuorchè la sola dettata con animo di publicarla ed è questa: e la non è prefazione, da che io non presumo di darti un libro d' autore. Onde discorrerò teco quanto nelle altre lettere con gli amici miei; e con pari sincerità. E quand' anche tu non l' accolga con pari fiducia, t' accorgerai, spero, ch' è lettera d' uomo ad uomo.

I miei pareri intorno agl' Inglesi derivarono tutti da sentimenti istantanei, spassionati d' astio o d' amore; ond' io li tengo per equi:—ma a promettergli giusti bisognerebbero esperimenti più cauti e più lunghi. Se non che il troppo esaminare assedia il giudizio di dubbj, e disanima la fantasia, che, quasi ispirazione, ci muove ad esprimere ingenuamente i sensi e i pensieri destati in noi dalla presenza di cose nuove.

A quanto dico de' miei concittadini troverò forse contradittori;—non però credo che nessuno mai potrà smovere nella mia mente opinioni avveratemi da molti anni di prove, dalle calamità dell' Italia, e dal mio proprio dolore.

(Foscolo, *il Gazzettino del Bel-Mondo*.)

III.

GRAMMATICAL QUESTIONS.

1. Give the gender and the plural number, with the appropriate definite article, of the following nouns:—*monaca, tribù, legista, occhio, tempio, arte, serie, clima, bue, scoglio, giuoco, crisi.*

2. Form the adverbs from the following adjectives and participles:—*celato, mortale, leggiero, avido, vezzoso, militare.*

3. Write the conjunctive personal pronouns for the three persons in both genders and numbers in the dative and accusative cases.

4. Write the whole present tense of the indicative of *venire;* the preterite of *volere;* the future of *potere;* the imperative of *andare;* the subjunctive present of *aprire;* the subj. imperfect of *stare;* the participle past of the verbs *fare, chiedere, offendere, scegliere, perdere, rispondere, morire, conoscere, divenire.*

(*To be continued.*)

HARVESTING CORN IN WET WEATHER.

Prize Essay.

By W. A. Gibbs, Esq., of Gillwell-park, Essex.

(*Continued from page* 785.)

I think it is hardly needful to do more than indicate the absurdity of a recent proposition,* to revert to the old Roman plan of beheading the corn as it stands in the fields, and carrying it off in "sheets," or otherwise, to dry by itself, leaving the straw to take its chance of a future mowing when nearly spoilt. This system has been partially revived in Australia, where the straw is comparatively worthless, but in a country like ours, where it constitutes so large a proportion of the value of the crop, a plan that sacrifices this value, and involves a second mowing, is not likely to be looked upon with much favour or affection, and could only be thought of as the last resource of a forlorn hope.

The custom prevalent in those great corn-producing provinces of Russia—Courland, Livonia, and Lithuania, is somewhat better worth consideration. In those districts it is the usual and long-established practice to dry the grain-crops in a kind of wooden shed, which, by a few additions, is made to do duty as a rough-and-ready kiln; this is considered one of the most indispensable appendages to a farmery. The sketch (Fig. 7, p. 794) will show the arrangement of the under-furnace and sparkstone, above which an open flooring supports the sheaves when packed in upright and close together. A fire of wood is lighted in the furnace, and when it has burnt out its flame, and nothing remains but a large mass of red-hot embers, the sheaves are placed on the sparred floor, all the doors are shut, the end ventilator opened, and the action of this slow and gradually decreasing heat left to do its work of desiccation, which it generally accomplishes in twelve hours. It is found that this artificial drying does not in any degree impair the germinating power of the seed, whilst it improves the quality of both straw and grain for use, and enables the farmer to thresh out and export his corn at once, or to store it in the straw with perfect security against mildew or mustiness. So far, then, the plan seems eminently useful and successful, but there are great difficulties in the way of its adoption in this country. In the first place we have no supplies of wood for fuel, as in Russia; common coal would be, of course, out of the question for such a purpose, on account of its gas and smoke; and neither coke nor malting coal would burn in a shed without a chimney draught. In the second place, we have no "building wood" here, as in Russia, at a merely nominal price; hence our sheds would be much more expensive to erect, and entail a much heavier loss if accidentally burnt down; a consummation which would probably be an occasional consequence of lighting large fires in a wooden erection filled with straw; and, in the third place, a shed of this kind would require to be of a most unwieldy size, if it were desired to dry the crops of a large farm within a reasonable time. Loudon† gives the dimensions of a Russian kiln as 15 feet square, and says that such a building would hold 300 sheaves; but either the sheaves in Russia are only one-third the size of ours, or else this is a curiously wide mis-statement. I have ascertained, by absolute measurement, that 300 sheaves, such as are usually tied in this county (Essex), would require a shed of fully three times that capacity, *i.e.*, 15 by 45 feet, instead of 15 by 15. Now if we take 500 or 600 sheaves as an average produce per acre, this shed of 15 by 45 would only enable a farmer to clear about an acre in 24 hours, working it night and day; hence, if he wished to clear 10 acres in the 24 hours, which would be no very unreasonable desire, he would need ten sheds of this size, or one stupendous building of 45 feet by 150 long.

The various expedients hitherto used or proposed having thus been passed under review, and, from one cause or another, none of them appearing able to fulfil our most urgent want, viz., a means of finishing and saving our harvests in wet seasons, I may perhaps now be allowed to give a short detail of my own attempts to solve this problem. This detail will consist mainly of a "History of Failures;" and my apology for recalling some of these, before giving the final results, rests upon the hope that one man's failures may either suggest other men's successes, or save fellow-labourers in the same task from wasting fruitless labour upon method already proved to be impracticable.

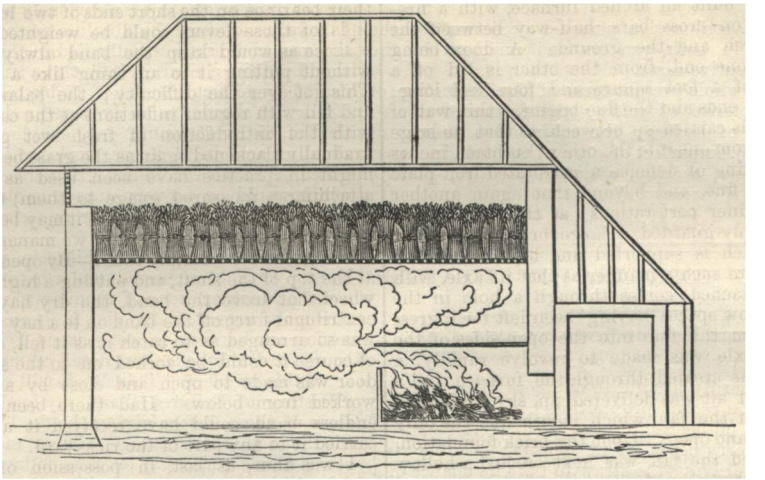
The harvests of 1860 and 1861 will be recalled with painful memory by everyone who had the misfortune to be a farmer in those years; and many a hard-working tenant, who had by dint of frugality and prudence managed to keep himself and his family upon the small farm which his father and perhaps grandfather had held before him, dates from those disastrous seasons—coming as they did, like the messengers of Job, one upon the heels of the other,—his loss of that independence which he had striven for so manfully and held so dear.

It is very hard for a small farmer, with the increasing expenses of a young family upon his hands, to lay by enough to tide him over such rainy days as those; and when it is considered that upon a little plot of 60 or 70 acres of grass-land, the loss by depreciation of quality of the hay was fully £200 on the two years, and that, in some cases, such loss would be doubled by the injury of the grain and straw also, it is easy to see why many an honest fellow lost his all, and had to turn out, and begin life again in a lower rank. However much in accordance with the principles of strict political economy it may be, that small farms should be agglomerated into large ones, and their owners reduced to the convenient dead level of day-labourers, the operation is a very painful one to witness. It was, then, with the strong desire, and a good hope, of devising some means of saving such men from such disasters, that I commenced a series of definite experiments upon the artificial drying of hay and corn in wet seasons.

The first thing to be ascertained was whether artificial heat in any way destroyed or deteriorated the quality of the thing subjected to it;—and this was easily tried as far as grass was concerned. I cut up a carefully-varied selection of grasses into half-inch lengths, and, weighing 100 grains of them in a delicate chemical balance, dried them on a sheet of letter-paper; the 100 grains of grass left only 20 grains of hay; but this hay was finer in colour and scent than any that I had ever seen made in the ordinary way; it was, however, much too dry; because I found, by comparative analysis, that well-made hay is by no means absolutely free from moisture, but contains, on an average, 18 to 22 per cent. of water; hence, in all subsequent experiments, I was careful to leave about that proportion of moisture in the artificially-dried hay, this being, indeed, essential to the beneficial fermentation and consolidation which should always take place in the stack. After repeating and verifying these and other minor experiments, the next question was as to the various ways and means of carrying out the object in view. I spent many weeks in

* See letter in *Agricultural Gazette*, 5th October, 1867.
† "Encyclopædia of Agriculture," p. 762.

Fig. 7.



investigating the powers, and calculating the costs, of both ancient and modern modes of heating and drying by stoves, hot water, steam, slow ventilation, and hot air, and came to the conclusion that the old plan of a common malt kiln (as being simple in construction, and utilizing, for the purposes of evaporation, the whole of the heating power given out by the coal) was best worth trying first. I confess I did not expect it would answer, because one would naturally suppose that the sulphurous gases would discharge the vegetable-green colour from the hay, and that the other products of combustion would impart to it a burnt and empyreumatic taste and smell; but I was weary and perplexed with deliberations, and so made a dash at it, and sent a load of rowen, that had been kicking about the fields for two or three weeks of that wet autumn, down to a friend's malt-kiln, first re-insuring him (as in fairness bound) against all hazards of fire that might follow from the experiment. I confess that when I saw an enormous fire of malting coal, only a few feet below the open-wire floor, whereon we were to spread and toss about this rubbish until it became dry and inflammable, I was half inclined to forego the trial, as rather too "risky." However, we "pitched it in" from the cart, and my man and myself took it in turn to go into the kiln after it about every five minutes, and shake it up with a hay-fork, so as to get it evenly dried. The temperature of the air was 120° to 130°, and the fume of sulphur considerable, but by no means unendurable, and we could stay three minutes at a time in it without much inconvenience; in 25 minutes I was rewarded by finding that the reeking-wet, ill-smelling, discoloured, half-made, and half-spoiled rowen, was dry enough for stacking, and had improved both in colour and scent to such a degree that, when we forked some down out of the kiln into a little meadow, where horses and cows were feeding, they all came up and ate it eagerly. Here, then, was a first and very useful fact, proving that fuel might be employed in its most economical form of application, viz., that of utilizing all the products of combustion at once, and without the intervention, cost, and waste of complicated apparatus.

Of course it was needful to repeat experiments in this form with more care and accuracy, in order to obtain positive data as to the weight of the hay before and after drying, and the loss by waste in the process. We therefore constructed an impromptu kiln, by lining a saw-pit with plate-iron, placing a furnace below, and nailing on a floor of malting wire a few feet above. Experiments with this arrangement soon indicated the weak points of kiln-drying. Of course all practical men know that if hay is to be dried it must be lifted and "lightened-up" occasionally, so as to allow the air to pass through it; and this we found to be still more essential when hot air was employed, for if it was left more than three or four minutes without being turned, the under layer matted itself down, became over-dry, and then (dry hay being a non-conductor) prevented the heat from passing up to the wet layers above. Now, however gently and carefully we moved this about, we found that the hay-seeds first shook through the meshes of the wire floor in such quantities as greatly to impair the value of the remaining hay, and then by degrees choked up the wires so as to stop the passage of the hot air entirely. Thereupon we abolished the wire and substituted a floor of thin iron-plate, moved the furnace to one end of the pit, and made a chimney of stove-pipe at the other, but with no great success, for three-fourths of the heat went up the chimney, although sixteen feet off, and the remaining one-fourth dried the hay too slowly and expensively. These two failures set aside and negatived several mechanical arrangements which I had had in view, one of which was to have been a hay tedder, either revolving on a round kiln-floor, or traversing to and fro upon a long square. Another was to lengthen the hot-plate floor and have an endless chain with tines to "creep" the hay along its surface from one end to the other, with the idea that perhaps in a length of say 30 or 40 feet the hay would go in wet at one end and come out dry at the other. I tried this plan on a sufficient scale to show its inadequacy, which arose not alone from the primary objection of the loss of heat by the necessity of a chimney draught, nor from the disappointing fact that a slow march of twice fifty feet does not suffice to make wet hay dry, but, conclusively, from the inherent defect that the mere "creep" action does not lighten and change the surface of the wet hay sufficiently to allow the heat to permeate through it. Finding this, I went next, of course, to the other extreme, and had a great plate-iron semi-circular vessel, like a half-drum, made and placed over a fire, and caused an axle with tines to revolve slowly in it, carrying up the hay and shaking it out; "shaking it out" indeed this time with a vengeance! the result being a shower of seeds, broken stalks, and clogged axles.

My next model seemed to give so fair a promise of success, that I had an apparatus constructed from it, on a sufficiently large scale to put its promise to the practical test of performance. I should like to describe with some minuteness the construction and mishaps of this apparatus, because I think it may save others from wasting time, thought, and money upon the same subject. Conceive then, reader, if you please, a trench dug in the

earth, three feet deep, three feet broad, and about nine feet long, in which is built an arched furnace, with a fire-grate supported on cross bars, half-way between the crown of the arch and the ground. A door being adjusted at the one end, from the other is led off a horizontal flue, of a foot square and four feet long; where the furnace ends and the flue begins, a thin wall of perforated bricks is carried up between, so that no large cinders can pass from one into the other; eighteen inches beyond this first line of defence a perforated iron-plate is built into the flue, and beyond that again another plate, with still finer perforations; at the open end of the flue, thus triply guarded, a large brick box is now carried up, in which is supported and built-in an iron fan or winnower, in such a manner as that its axle, with driving pulley attached, comes through a hole in the brickwork. Hollow spaces having been left for ingress of the hot air from the flue into the open sides of the fan, when that axle was made to revolve rapidly, a strong draught was created through the furnace, and a vast volume of hot air was delivered up, skyward, from the wide mouth of the fan, which mouth was the only feature left visible and open. Upon the brick foundation, which thus encased the fan, was next erected a hollow wooden shaft or chimney, of about two feet square and twenty feet high. At four feet from the ground an opening was made into this chimney; then, by means of slots cut in the sides, we adjusted an iron axle, carrying a wooden drum or roller two feet long and nine inches diameter; a corresponding drum and axle were also adjusted nearly at the top of the chimney, and an endless band of the strongest sail cloth, also two feet broad, was stretched over both these rollers; a driving-wheel and handle being now keyed on to the lower axle, where it protruded through the sides, and movement being given to the lower drum thereby, the upper drum and canvas band revolved very smoothly and pleasantly. We next prepared a number of tines on bars, like the tines and bars of a hay tedder, and fastened them on to the endless band at intervals of about fifteen inches apart. All was thus ready for the preliminary trial, and when the outer wheel was turned, armfuls of hay and straw were carried slowly up by the ascending tines, and, upon passing over the upper drum, they fell gently down, being checked and shaken out in their fall by the descending tines.

Our next care was to provide for the movement of the fan at a sufficient velocity to drive up an ascending stream of hot air, to meet the falling grass, and so dry it. By borrowing the fly-wheel from the oat-bruiser, and some of the multiplying cog-wheels from the lawn-mower, we achieved a very respectable speed, considering that we had only hand-power to drive with; and when we lighted a good fire of malting coal in the furnace I obtained a strong stream of air at 280° by having the fan kept steadily going. But the first effect of this hot air was somewhat baffling, for it made the canvass band so slack that the rollers took no hold of it; we pulled it round by hand to its place of joining, and overlapped it till it was again taut, and then again set both machines to work; all went well for a time, and wet grass was fed freely in at the lower opening, and falling over as it reached the upper drum, meeting the current of hot air, had the water driven out of it in the shape of steam from the top of the chimney; but by-and-bye, as the band became wetted by the water in the grass, it contracted itself so forcibly that the axles of the drums groaned and squeaked in their sockets, the man at the wheel could no longer turn it, and finally the canvass burst from its last lacings. It was not easy to see how to overcome this awkwardness of alternate expansion and contraction, without adopting the expensive and heavy substitution of iron work for canvass. By means of a small model, which I could cut and hack about in various ways without compunction, I found at last that by cutting two grooves in the sides of the chimney, so as to allow the axles of the upper drum to work up and down, and then making those axles take their bearings on the short ends of two levers, the longer ends of those levers could be weighted to just such a balance as would keep the band always tight enough, without putting it to anything like a bursting strain. This got over the difficulty; the balance weights rose and fell with regular inflections as the canvass tightened with the introduction of fresh wet grass, and then gradually slackened again as the grass became hay; they might in practice have been used as indicators (by attaching a measured guage to them) to tell when the hay was dry enough. And here it may be well to explain how, when it *was* dry enough, we managed to get it out of the chimney. Simply thus:—By opening a trap-door at the top of the shaft, and putting a higher speed on the wheel that drove the band, the dry hay flung itself by centrifugal force off the band on to a hay platform, which was so arranged as to catch it as it fell, and from which of course it could be forked on to the stack; the trap-door was made to open and close by a cord and a rod worked from below. Had there been need, another endless band could have received it at the top, and carried it to any part of the rick-yard.

I was thus, at last, in possession of an apparatus which, although rough and primitive, was yet "workable," and which enabled me to obtain some positive data as to the average quantity of water which had to be expelled, and the cost of expelling it. Many experiments with this machine demonstrated that raw grass could be converted into fine green hay by the hot air and gases from a furnace, without detriment to its quality. But my object in attempting artificial means was not to *supersede*, but to *supplement*, nature; and I knew that in the worst seasons a very large proportion of the water that we have to evaporate from grass, in order to convert it into hay, can be got rid of in the fields by the usual methods. The mere withering out of the sap, which goes on in spite of frequent rains and absence of sun, will effect this. Hence the question to be answered was, how much coal will withered grass or wetted hay require to finish it and make it fit for stacking. To answer this, I carried out a large number of experiments, extending over two seasons, during which the first crops and after-math were subjected to trial in many various degrees of greenness and wetness. The average proportions obtained in this way indicated that one ton of withered grasses, or imperfectly made and wetted hay, holds in combination quantities of water varying from 5 cwt. to 15 cwt., and that to free it from those quantities, and render it fit for stacking, required respectively (with this rough and imperfect apparatus) from 1 cwt. to 3 cwt. of coke. Now, taking coke to cost 1s. per cwt., these results showed that the mere cost of fuel would certainly not be a bar to its employment for this purpose, because every farmer knows how often a bad season discolours and depreciates the market value of his hay to the extent of 10s., 15s., or 20s. a load; and many are aware that alternate sun and rain destroy its fragrance, and wash out nearly all its soluble and nutritious principles, whilst the repeated "shaking out," which this frequent wetting and drying render necessary, knocks out a large quantity of the seed. The waste from these two causes alone often amounts in mere weight to a quarter of a load per acre, and "mere weight" by no means represents the whole of the loss. If any large proportion of the hay is retained by the farmer for feeding purposes, he will get less milk from his cows, less mutton from his sheep, and less work out of his horses; but leaving these last considerations out of the estimate, the two items of inferior quality and worse yield show an absolute money difference of from 30s. to 40s. between ill and well saved hay. Now, the 3s. worth of coke expended to save this loss will leave a large margin for such extra labour as the process might require. To ascertain the cost of labour with any degree of accuracy needed a much larger and more finished apparatus than my present one, so the next point to be

considered was, what sized machine would be required to cope practically with a wet harvest, and what cost of labour would be involved in working it? With regard to the last question, I had always had it in view to employ the portable steam-engines (now hired out for threshing), to give movement to the machinery, so as to utilize the waste heat from their furnaces to supply hot air to the fan, and the waste steam from the engine to heat metal plates or pipes in the shaft.

My working model was two feet square and 20 feet high, and as that was able to convert a charge of 40lbs. of wet into 30lbs. of dry hay, in fifteen minutes, giving an average of 120lbs. an hour, it would have been easy to calculate from these data how much larger the full-sized apparatus should be; but it was fairly to be expected that the adaptation of steam chambers or hot pipes in the shaft, would not only economise fuel but expedite the drying to such an extent as largely to modify the calculation for size. In order to test this, in my smaller model (of one inch to the foot) I introduced front and back plates, and heated them by steam. With this addition, hay that had taken fifteen minutes to dry *without* the plates, was dried in ten minutes *with* them—hence it followed that in the large model half as much again could have been dried by the aid of hot plates—that is 180lbs. per hour in place of 120lbs.; this would have been equal to nearly two tons in twenty-four hours; thence it followed that a machine five times the capacity of this present one would have been able to dry and deliver at the top of the stack nearly ten tons in the same time. I judged that the power of dealing with a less quantity than this would not suffice for real work, and yet a shaft of 24 feet high, 10 feet wide, and 2 feet broad, with its hot plates, endless band and tines, rollers, wheels, levers, and balance weights, all in proportion to this increased size, would have been both costly and unwieldy.

Machinery is very pretty, especially in a case like this, where it had done its work so well—carrying up its charge of wet hay and pressing it slightly against the hot plates of the ascending side, and then suffering it to fall slowly down over the reversed and descending tines, shaking itself gently open, so that the rising current of hot air could penetrate through every part of it, yet without any rough action to break the stalks or shake out the seed. It was also very satisfactory to see the hay fling itself out at the top, when dry enough, by the simple action of centrifugal force, and to find that, with one little contrivance after another, the whole thing was as nearly as possible automatic. I felt convinced also, by watching the action of it, that it could have been readily adapted for drying wheat and other grain crops in the straw, damp or sprouted corn in the seed, malt after steeping, and in fact anything requiring slow and regular movement, simultaneously with a perfect exposure to a powerful stream of hot air. All inventors, therefore, will sympathise with me in the mortification with which I consigned this promising apparatus to the limbo of oblivion, in order to make way for a simple, rough-and-ready process of effecting the same ends. I was, however, sufficiently acquainted with the urgent requirements of most farmers, and the prejudices of some, to know that unless a process was eminently simple, inexpensive, and not liable to derangement, it would take a long time before it would be generally adopted. With a view to meet these requirements, I sacrificed much that *was*, and *may even yet*, be found advantageous in the way of mechanical contrivance, and began the third course of experiments by directing streams of hot air from the fan's mouth upon masses of wet hay laid in an open wooden trough, causing such hay to be lifted and lightened up occasionally with forks, so as to bring each part of the mass, in turn, under the direct action of the air. The first result showed, several times over, that 25lbs. of half-made hay lost 10lbs. in fifteen minutes, the temperature of the ingoing air being 250° to 280°; the hay so finished was (as before) fragrant, of good colour, and readily eaten by stock of all kinds. I now took 21lbs. of this dried hay and drenched it with water, of which it retained 11½lbs. making its total weight, in the wet state, 32½lbs. It was then again subjected to the hot blast, and in eleven minutes was reduced to 16lbs., and had lost very much of its fragrance. I record, and would ask a close attention to this experiment—it being confirmatory of what I have before advanced as to the loss sustained by the action of alternate rain and sunshine, and as confirming also what observant practical farmers have frequently told me, viz.—that the loss of *weight alone* in a bad season is equal to nearly a quarter-load per acre—say 20 per cent. Whilst upon this subject I may mention that, on referring back to my own rough analysis of hay, I found that water had extracted from it 18 per cent., so that probably a large proportion of the 20 per cent. loss by wetting would consist of the soluble and more valuable portions.

To return, however, to the drying experiments. I next took some hay, almost, yet not quite, ready for stacking (a condition in which it is very constantly found towards evening in harvest time); it had been cut two days, and only once shaken out, and then winrowed up. I ventured to increase the temperature of the blast to 320°, and thus reduce 30lbs. of this hay to 22lbs. in four minutes, it being then perfectly fit for stacking. This was a very useful indication of the rapidity with which hay may be dealt with when it has arrived at that tantalising point where it only needs two or three hours more sunshine to finish it. And this is the point at which art may be most usefully called in to the assistance of nature. Let us ever continue to use all the aid that sun and wind, skilful implements, and well-applied labour place at our disposal; but when these fail, let us, if possible, have other means at hand to complete their work. It was, therefore, chiefly as a matter of curiosity that some experiments were now made upon raw wet grass, brought in from the fields within an hour after cutting; and I should hardly have given any record of these but from a recent suggestion that the new and striking successes lately obtained in the enormous growth of grass by means of sewage may probably render it needful to dry and store some portion of this growth at times of the year when sun and wind are not much to be depended on. I may therefore briefly mention that 45 lbs. of such grass, saturated with the heavy morning dew, was dried into 9 lbs. of bright green fragrant hay in fifteen minutes by maintaining a steady temperature of 320° for the ingoing air. This was my first experiment with steam power in lieu of hand labour, but I have since, with my smallest model, succeeded several times in drying grass in a similar condition into perfect hay in six minutes, using a temperature of 380° and a velocity of 1,650 revolutions per minute.*

(*To be continued.*)

SCIENTIFIC EDUCATION IN FRANCE.

The Minister of Public Instruction, in his report, already referred to in the *Journal*, speaks of the efforts which have been and are still being made in America, Germany, Russia, and England, for the establishment, at great cost, "of those arsenals of science called laboratories;

* Still more recently (viz., 22nd June, 1868) grass upon which a four hours' rain had fallen was cut and brought at once to the open shed of the wheat-dryer, the floor of which had been removed; and this grass being merely thrown on the ground before the mouth of the hot blast, and lifted and shaken out by two men with hay-forks, was converted into green hay in seven minutes; the temperature of the ingoing air being 300° to 320°, and the velocity of the fan about 600 revolutions per minute. The Duke of Sutherland, the Marquess of Kildare, Lord Blantyre, Sir T. F. Buxton, and several other gentlemen were present at this experiment. On the following day an average load of wetted hay was, by similar treatment, rendered fit for stacking in forty-nine minutes, and sent up by the atmospheric hoist to the top of the stack in twenty-five minutes.

schools, in fact, which are formed around professors of renown, and which assume the perpetuity of scientific progress, and are a serious menace against one of our most legitimate ambitions."

Referring to the inefficiency of existing establishments for the purposes in view, the minister says:—"It will not be necessary, in order to obtain what is wanting, to impose great sacrifices on the country, for if the Sorbonne, the Museum of Natural History, and the School of Medicine require enlargement, the cost of the necessary buildings may be divided over several years."

The minister points out that the lectures of many of the professors in Paris are delivered rather to chance listeners than to earnest pupils, and proposes that the character of the teaching shall be modified with especial view to the benefit of the latter class. "The moment," he says, "when our professors shall, as in the German universities, have veritable pupils, without neglecting the precious qualities of our national spirit, and without renouncing the art of good speaking, which is inseparable from that of good thought, they will give more time to the labour of literary or historical erudition, held in such high honour on the other side of the Rhine, and not sufficiently so at present amongst us." The government having obtained from the Corps Legislatif the means of increasing the stipends of teachers of the superior class, can ask them to give, in addition to the lessons delivered to numerous auditories, didactic instruction reserved for a limited number of persons. Some of the faculties have already taken steps in that direction, and the rest must follow. The secondary normal schools now being formed in connexion with the faculties in the provinces will doubtless yield the first supply of pupils for the new courses.

What is said above of letters applies equally to instruction in science. In the scientific courses, says the minister, our students must be more exercised in those operations peculiar to each kind of research, for every science, mathematical analysis excepted, has its necessary exercises.

All the establishments which lead direct to a profession, such as the faculties of medicine, and the superior schools of pharmacy, practical exercises, such as dissection, chemical analysis, &c., form a necessary portion of the normal course of scholastic studies, but it is not the same in the faculties of science, or in the great scientific establishments. Each chair of chemistry, of natural philosophy, and of natural history, has a laboratory attached to it, in which the experiments necessary for the professors' lessons are made, but they are at present closed against the students, to whom they should be opened, though not to mere casual listeners; and such laboratories of instruction would become schools, from which the directors of the proposed laboratories of research would select their assistants.

The laboratories of research, says the minister, would be equally useful to the masters and public, and would, therefore, ensure the future progress of science; the pupils, already well grounded in theoretical knowledge, and accustomed in the laboratories of instruction to the use of instruments and elementary manipulation, would, in the laboratories of research, be grouped in small numbers around an eminent teacher, would be stimulated by his example, and would practice, under his eyes, in the art of observation and the methods of experimentation. This has already been the case in the few laboratories of research existing in France; and it is through institutions of this kind that "Germany has arrived at that large development of the experimental sciences which we watch with uneasy sympathy."

In many cases the same building may serve for laboratories of both kinds, and the same professor may be at the head of both, with advantage to science and economy in working.

One innovation, very remarkable for France, is introduced with respect to the laboratories:—"The essential condition of these laboratories," says the report, "will be that the professors in charge of them shall have entire liberty to carry on their own labours as well as of the studies of their pupils, without reference to any official programme, in the manner they may believe most advantageous to science."

L'École Pratique des Hautes Études is the crowning of this new educational edifice. It has often been argued that the student of pure science is little assisted in his studies, or rather that such assistance sadly wants system and precision. The French school of chemistry has had the benefit of a regular school, and French chemistry has thereby greatly benefited. It is now proposed that all the sciences shall have the same advantages by means of the new school in question. "The words practical school," says the minister, "must not be taken in their ordinary sense, which would call up ideas of industrial utility, but in the most elevated sense, as expressing the fact that the work, both of the eyes and of the hands, is necessary to confirm and extend the highest and the most delicate conceptions of the scientific spirit. What is chemistry without manipulation, philosophy and physiology without experiment, or botany without herborization."

To give an example of the working of the system, the pupils of the mathematical section will be admitted to courses at the observatory, where they will be initiated into the theoretical knowledge that astronomical mathematics demand, as well as in the use of all the instruments employed in astronomical observation, thus forming a veritable school of astronomy.

In philology, the faculties of the University of Paris only teach the classical languages, and in history only the general history of antiquity, of the middle ages, and of modern times. The programme of the new school will include archæology, the science of language, paleography, comparative philology, general grammar, critical history, &c.

The Ecole Pratique will, of course, not be a special establishment; the pupils will be non-resident, and will attend the various courses as students in medicine attend the faculties, the hospitals, the museums, and the anatomical schools.

"There is no question," says the report, "that youths belonging to families in easy circumstances will be attracted to this school by its liberal character, without asking for public employment at the time of quitting it. The practical schools of the Museum of Natural History, by way of example, will assist in forming around that establishment a real faculty of agriculture for the study of the laws of animal and vegetable production, with which every proprietor of land or agriculturist ought to be acquainted."

The flexible organization thus given to the new practical school, renders it applicable to the faculties in the provinces as well as in the metropolis.

The report is followed by two imperial decrees. The first establishes the laboratories of instruction and research. By the first article, the laboratories attached to the various chairs are declared open as laboratories of instruction, for manipulation and practical experiments, to candidates for the licentiate, to pupils of the new Practical School, and also to candidates for admission to the school who have passed the preliminary examination. Should the accommodation be at present insufficient, the professor is to examine the candidates, and to admit them by order of merit.

The second article orders the establishment of laboratories of research, by the minister, on the advice of the Superior Council of the new Practical School, and the supply of the necessary funds from the special grant referred to above, both for the material of the laboratory and the payment of the director. The director is to recommend to the minister the appointment of the necessary assistants, and a list of the pupils he proposes to admit to the laboratory. The minister is also authorized to grant annual indemnities to professors who may establish laboratories of research, independent of public institu-

tions. (One, if not more, already exists in Paris.) The minister may, moreover, upon the advice of the superior council, accord indemnities to pupils admitted to these laboratories.

The first article of the decree for the establishment of the new school runs as follows:—"A practical school of superior studies as established in Paris, in connection with the scientific establishments under the Ministry of Public Instruction, the object of which is to join to theoretical education those experiments and exercises which may fortify and extend it." The School is divided into four sections:—1. Mathematics; 2. Natural philosophy and chemistry; 3. Natural history and physiology; 4. Historical history and philological science. The professors of the second and third sections will take the title of directors of laboratories, and those of the other two sections that of directors of studies.

No condition, with respect to age, grade, or nationality, is laid down with respect to pupils of this school, but all candidates must go through a probationary stage of three months or more, at the end of which time they are to be classified by the director, assisted by a permanent commission. Admission remains finally with the minister, and a pupil may belong to two or more sections. No pupil to remain more than three years in the school.

The pupils are expected to furnish written memoirs on given subjects, and analyses of books of science or erudition, foreign as well as French; to make researches in the libraries and museums on given subjects, and to report the results in writing. The pupils in the section of natural history and physiology will take part in scientific excursions directed by the professors; and those belonging to the sections of mathematics, natural philosophy, and chemistry will visit workshops famous for their machinery and tools, or for special methods of manufacture.

The minister may, with the advice of the superior council, grant annual allowances to pupils of the school; and pupils who exhibit great aptitude may, in like manner, be allowed to present themselves for the degree of doctor without passing through the licentiate.

Pupils who have passed through the superior normal school, and those who have taken the degree of *agrégé* of public instruction, may be named by the minister, for the period of two years, assistant-professors or "preparators" in one of the sections of the new practical schools, with an allowance, according to position, of 1,200 or 2,000 francs.

The assistants or pupils of the school will be employed by the minister in scientific foreign missions.

Each section of the school will be placed under the charge of a permanent commission of five members, named for three years, by the minister, from amongst the directors of the school; other directors to form part of the commission whenever any question relative to their own laboratory is to be discussed.

All the directors are expected to furnish annual reports of the working of the classes or laboratories.

The superior council of the school consists of the perpetual secretaries of the Academies of Sciences and Belles Lettres; the administrator of the College of France; the directors of the Museum, the Observatory, the Ecole Normale, the Imperial Archives, the Ecole des Chartes, the administrator of the Bibliothèque Impériale, the curators of the Museum of Antiquities, the deans of the Faculties of Sciences, Letters, and Medicine, with the members of the four permanent commissions above mentioned. This council, besides advising the minister on all important points relative to the school and laboratories, may recommend pupils quitting the school to appointments as teachers in secondary schools, as preparators, assistant naturalists or astronomers, librarians, &c.

The council to meet at least twice in the year, at the commencement and closing of the annual course.

Certificates of study, medals, honourable mentions, subventions, and special recompenses will be given to the pupils of the school at the end of each scholastic year.

It will be perceived that there is no mention throughout the report or the decrees of any fees to be paid by the pupils.

This is certainly one of the most important attempts ever made to bring the highest class of education within the reach of all who possess the necessary preliminary knowledge, together with sufficient capacity to offer fair promise of success. The scheme may seem complicated on paper, but when it is remembered that it consists entirely in the retension and popularising of existing means of instruction, the apparent complication disappears.

Fine Arts.

Works of Art ordered by the City of Paris during the Present Year.—According to a Paris journal, the artistic budget of the City of Paris for the present year amounts to the sum of £13,882, and the following is the list of commissions given to artists:—Two paintings for a chapel in the church of St. Bernard—artist, M. Porion. Decoration of the chapel of St. Vincent de Paul, and restoration of stained glass window in the church of St. Etienne du Mont—M. Felon. Church of St. Eustache: painting for the chapel of the Sacré Cœur, by M. Humbert; and window *en grisaille* for the chapel of St. Anne, by M. Lafaye. St. Germain des Prés: a crucifixion, by M. Montagny. St. Gervais: three figures in stone, by M. Marcellin. St. Jacques du Haut Pas: decoration of the chapel of the Virgin—M. Auguste Glaize. St. Jean Baptiste: fine painted windows—M. Steinheil. St. Joseph: the whole of the windows to be painted, by M. Oudinot. St. Laurent: decoration, enamelled on lava, for the portico, by M. Paul Balze. St. Médard: painting for the chapel of St. Catherine, by M. de Pommayrac. St. Nicholas des Champs: painting for the chapel of St. Bruno, by M. Kaplinski. St. Roch: two groups in stone for the façade, one by M. Victor Vilain, the other by M. Vital Dubray; statues, in stone, St. Clotilde, by M. Loison; and St. Geneviève, by M. Aizelin. St. Sulpice: two large paintings for the transepts, by M. Signol. The following are for the new monumental buildings:—Church of St. François Xavier: the mission of the apostles, by M. Cazes; the four evangelists, by M. Elie Delaunay; the decoration of the chapel of the Virgin, by M. Jules Lefebvre; a statue of the Virgin, by M. Bonnassieux; a bas-relief for the fronton, by M. Jules Thomas; two figures of angels, by M. Falquières: a statue of St. Peter, by M. Sanson, and of St. Paul, by M. Franceschi; a bas-relief of the Pascal lamb and two angels for the principal door, by Madame Bertaux; two painted glass windows and three roses, thirty-four windows *en grisaille*, and twenty-one other decorated windows, by M. Ottin, fils. St. Pierre de Montrouge: bas-relief, in stone, of the Last Supper, for the high altar, by M. Maniglier. Vaudeville theatre: ceiling, and four panels, representing Comedy, Fairy, Music, and the Drama, by M. Mazerolles. Ecole Turgot: bust of the founder, by M. Courtet; and bas-relief for the fronton, by M. Maillet. Fountain of the Chateau d'Eau: models of lions, by M. Alfred Jacquemart. In addition to the above, the City has ordered a commemorative medal of the new church of St. Augustine of M. Alphée Dubois; a similar medal of the church of La Trinité of M. Borel Valentin; an engraving of the Calvary, painted by the late M. Flandrin, in the church of St. Germain des Prés, of M. Poncet; and one of M. Hein's picture of the martyrdom of St. Cyr and St. Juliette, in the church of St. Gervais, to be executed by M. Achille Martinet. [*Mem.*—The former lists were not quite correctly dated; they ran from May to May, while this is for the current year, 1868. The present refers only to the Municipality of Paris.]

Congress for the Discussion of the Methods of Teaching Drawing, &c.—The meetings of this congress, already noticed in the *Journal*, are carried on with much animation. The first question in the second section was the following:—"Previous to the foundation of academies of the beaux arts, the graphic and plastic arts were only taught in the studios of artists. Public schools have now taken the place of the ancient mode of apprenticeship. What are the merits and the advantages of the two systems?" The discussion upon this question lasted three hours. M. Slingeneyer criticised the present organisation of academies, which he said arose in the decline of art, and had not produced the effect expected of them. The professor insisted on the necessity of teaching drawing from nature before that of copying from the antique; and recommended that while Government should appoint the director of an academy, the nomination of the professors should rest with the latter. M. Canneel, director of the Academy of Ghent, was of opinion that drawing after nature and from the antique should be taught simultaneously, and advocated the popularising and decentralization of academies. M. De Taeye sketched a plan combining the two methods of art education, namely, academic instruction, to develop the intelligence of the pupil and give him the necessary amount of science, and public ateliers where the pupils might receive instruction from distinguished artists. Many of the professors who spoke maintained the thesis that the business of academies was simply to teach the "grammar and orthography of art." A long and animated discussion took place on the methods of teaching elementary drawing, several of which were explained by their professors; "but," said one of the speakers, "whatever may be the method employed there is but one kind of drawing, and this rests on positive principles." He divided the teaching of drawing into four classes:—Linear and curvilinear drawing, relief and the effects of light and shade, and superior education, or art. "All the world learns to write, and all the world should learn to draw."

Manufactures.

Production of Silk in the Province of Cuneo.—The Chamber of Agriculture and Commerce of Turin have published the following official returns of the quantity of cocoons brought for sale at the various markets in the principal towns in the province of Cuneo during the present year (1868):—

Town		Quantity of Cocoons.
Alba	(Myriagrammes)	34,827
Bra	,,	12,422
Ceva	,,	8,118
Cuneo	,,	57,468
Fossano	,,	9,225
Mondovi	,,	13,226
Racconigi	,,	47,070
Saluzzo	,,	21,444
Savigliano	,,	11,864
Total		215,664

Commerce.

Printing of the Moniteur.—The minister, M. Rouher, having advertised for tenders for the printing and supply of the *Moniteur Universel* and *Le Petit Moniteur* for the French Government, the conditions of which had been previously published, made his adjudication a few days since. There were four tenders sent in, with caution money duly lodged. On opening the tenders it was found that all four offered to supply government with *Le Petit Moniteur* for each of the 40,000 communes of the empire for nothing. The minister then declared he would proceed to a new adjudication, which would be based on the furnishing the greatest number of *Le Petit Moniteur* to the government, independent of the numbers furnished gratuitously to the communes, in order that the most important of them might receive extra numbers. M. Wittersheim offered to give, in addition to the numbers to be furnished for each commune, 55,000; M. Pointel, 26,230; M. Charles Schiller, 25,005; M. Plon, 25,000. The adjudication was given in favour of M. Wittersheim, subject to the final approbation of the Minister of State. That the four competitors can offer such an enormous reduction, shows a considerable progress in the art of printing. The editor of *Les Mondes* considers this mystery is easily explained by the fact that M. Marinoni has invented a new press. In that rests the secret of this wonderful adjudication. M. Marinoni at first thought of offering to contract for the printing himself, so as to astonish the world by his low price; but on further consideration he determined not to incur so great a responsibility, not altogether suited to him, and he contented himself with negotiating with the four competitors for the adoption of his new press. It is he, therefore, who is in reality the printer of the *Moniteur Universel*.

Postal Statistics of Italy.—The following statistics of the receipts of the Post-office during the first half of the present year, as compared with that of 1867, is taken from the official returns just published by the General Director of the Italian Post-office:—

	1868.	1867.
Letters posted	41,056,737	40,746,626
Newspapers and periodicals	29,029,021	26,937,839
Other printed matter	4,913,210	4,480,442
Free correspondence, postal service, &c.	14,874,103	14,799,665
	Francs.	Francs.
Post-office orders issued	71,739,539	59,623,838
Total receipt of Post-office	7,734,666·78	7,430,286·45

Colonies.

Hong Kong.—The number of passengers visiting and leaving the city of Victoria is now estimated at 600,000 annually, the vast majority of whom are Chinese. The circumstances of this colony are entirely exceptional, inasmuch as Hong Kong, though an island, is separated in some places by scarcely a mile of water from the mainland, and is surrounded by the refuse of a large population specially addicted to piracy. During the past year the amount of gaol accommodation has been decreased; the quality of the labour exacted from prisoners has been made more rigorous, and the police have been entirely reorganised, resulting in a diminution of crime, as compared with previous years, of 30 per cent. Piracy has greatly diminished, a system having been recently adopted compelling all native vessels to take out licenses, by which means the name of every junk, with particulars of her armament, cargo, master, and destination, are obtained and recorded. The population of Hong Kong now numbers 115,000, of which 29,459 are females; these numbers being exclusive of the military and naval forces, and inclusive of 2,113 European and American civil residents. The imports for 1866 amounted to £54,613,008, and the exports to £32,592,295, exclusive of treasure, which amounted respectively to £12,771,967 and £13,862,955 sterling. The foreign trade with China in the same year amounted to more than ninety-four millions of pounds sterling; and of that trade the share of Great Britain amounted to seventy-one and a half millions, or nearly 63 per cent. of the whole.

Victorian Jams and Preserves.—The latest addition to the stock of new industries in this colony is a manufactory of jams and preserves, which form a considerable item in the consumption of the year. At one time the colony imported largely from home, latterly it has obtained its main supplies from Tasmania, but now the time has come when its fruit crops exceed the demand, and are being utilised in this way.

Railways in Victoria.—The returns of the Victorian railways continue to exhibit a marked improvement over those of last year. The aggregate receipts, from the beginning of the year to the 9th July, amounted to £286,937 14s., against £274,338 16s. 4d. taken during the same period of 1867, showing a balance in favour of 1868 of £12,598 17s. 8d. The weekly average this year has been £10,627 6s. 5d., against £10,160 13s. 11d. There are 254 miles now open. On the Melbourne and Hudson's Bay Railway a similar improvement is discernible. The aggregate returns for the past half-year amount to £67,309, against £64,814 in the corresponding period of last year. The weekly average has been £2,560, against £2,452 in 1867.

Industry in New South Wales.—The *Sydney Empire* says:—"The numbers directly employed in mining form a comparatively small proportion of the whole population, but they stimulate every other department of business, and add more largely to the wealth of the industrial and mercantile classes otherwise engaged than to the diggers themselves. Not only does gold mining give encouragement for the use of steam power, and for the more perfect instruments of industry, it disposes of numerous hands who would be of little use in any ordinary occupation, and who would make a living only where inferior forms of toil are well compensated and more in demand. No doubt there are the results of demoralisation to be taken into account, but when we look back upon the origin and progress of Australian colonisation, we shall see that fixed society has been greatly relieved by the existence of attractive occupations in districts remote from crowded cities. They, however, are not friends of the mining population who inspire them with unfounded expectations of great success, and discourage the slower process of gain which may result from more settled habits. There are no doubt gold fields that are grown into towns, and where there is a tendency in mining to become a permanent occupation, admitting of capital and division, in short reducing the system of getting gold to the common order and relations of a fixed industry. Whenever this takes place, there is a probability that the common employments will ultimately increase far above the enterprise which originally attracted the attention of the people, and that by the time mining is exhausted it may cease to be necessary. The occupation which first drew population to a particular centre will give place to still more profitable employments and pursuits."

Obituary.

Harry Chester, a Vice-President of the Society, died on the 5th inst., at his house in Rutland-gate, after a short illness, having only returned from Switzerland on the preceding Friday. He was the youngest son of the late Sir Robert Chester, of Bush Hall, Herts, Master of the Ceremonies under King George III., George IV., William IV., and Queen Victoria. He was born on the 1st October, 1806, and was educated at the Charterhouse and Westminster schools, from whence he proceeded to Trinity College, Cambridge, for a few terms, but quitted it in 1826 to accept a clerkship in the Privy Council Office, and was for a short time attached to the British Embassy at Lisbon. He was appointed assistant secretary to the Committee of Privy Council on Education in 1853, and held this office till 1858. He was a magistrate for Middlesex, and at his death was chairman of the Life Department of the Sun Insurance Company. Mr. Chester's connection with the Society of Arts arose in this wise:—In November, 1851, he addressed a long letter to the Council, proposing that an effort should be made by the Society "to develop existing, and to create new, institutions of the class commonly called Literary and Scientific Institutions, Mechanics' Institutes, &c., and to affiliate them to the Society of Arts." This letter having been considered by the Council, a committee was appointed to report on the proposal, and on the 18th May, 1852, a conference was held, at which the resolutions were passed which form the basis of the conditions on which the institutions then were, and are now, received into Union. This conference was presided over by the Marquis of Lansdowne; and among the supporters of the resolutions were Earl Granville, the Earl of Harrowby, the late Earl of Carlisle, the Bishop of Oxford, the late Dean of St. Paul's, Mr. Strutt, M.P. (now Lord Belper), Mr. Milner Gibson, M.P., and the late Mr. Joseph Hume, M.P. Out of this Union of Institutions grew the Society's system of examinations, the arrangements for which, as they are at present conducted, were due, in almost every detail, to Mr. Chester himself. The progress of this system of examination, from 52 candidates in 1856 to nearly two thousand in the present year; the special interest taken in them by the Prince Consort, who gave an annual prize of twenty-five guineas (still graciously continued by the Queen), are matters so well known to members of the Society, that it is unnecessary further to allude to them. At the opening of the session 1853-54, Mr. Chester was invited, at very short notice (owing to the resignation of Capt. Owen), to assume the chairmanship of the Council, and the address which he delivered on that occasion (the hundredth anniversary of the Society's foundation) will be in the recollection of many of the members. Mr. Chester, with a view to promoting a more extended knowledge of the educational appliances and systems in use both in this country and abroad, induced the Council to hold, in 1854, an exhibition of educational apparatus, which took place in St. Martin's Hall. It would be difficult to enumerate the many valuable suggestions made by Mr. Chester at the Council board, a large number of which resulted in useful and important action on the part of the Society; but it may be mentioned that in May, 1859, he proposed the appointment of the Committee on Musical Pitch, which resulted in the adoption, by a considerable number of our leading musicians, of the pitch then decided on. Among his more recent proposals may be mentioned the appointment of the Food Committee, in the formation and working of which he gave much valuable assistance. His constant attendance at the meetings of the Council and Committees, as well as at our evening meetings, and his numerous contributions to the *Journal*, show the unvarying interest that he took in all the operations of the Society; and it may be truly said that there was no face more familiar to the members than his, or one that will be more painfully missed at our various gatherings. He threw himself into all that he undertook, with an ardour which sometimes overtasked his physical powers; and an entire absence of all self-seeking was a remarkable feature in his character. His kind and genial disposition, and his singularly courteous manner, endeared him to all with whom he was brought into contact, and the Council, and especially the officers, with whom he was in almost daily communication, one and all, feel that his death has deprived them of a friend.

Notes.

The Mont Cenis Tunnel.—During the second fortnight of the past month (September) the progress made at the Mont Cenis tunnel was 54·45 metres; of which 25·10 metres were driven on the Italian side at Bardonnèche, and 29·35 metres on the French side at Modane. This

makes a total advancement of 106·85 metres during the month. The position of these works up to the 30th September was as follows:—

	Metres.
Length driven at Bardonnèche	5,211·10
Length driven at Modane	3,631·50
Total length of tunnel driven	8,842·60
Length remaining to be driven	3,377·40
Total length of tunnel	12,220·00

Precaution Against Accidents in Mines.—A new method of destroying choke-damp by means of electricity has been submitted to the Paris Academy of Sciences by M. Delaurier, and referred to the mineralogical section of that body for examination. The inventor proposes to place copper conductors, of considerable thickness, in the galleries; these are to be broken at intervals, and joined by means of very thin gold wire, soldered to the copper, the gold wire to be surrounded by flowers of sulphur, which ignites readily. By passing a strong current of electricity through the conductors, the gold wire becomes red-hot, the sulphur is ignited, and burns the mixture of air and other gases which may be present. By this means, says the inventor, the circuit is never broken; and if an explosion of gases take place, it is shown by the fact of the sulphur being blown off. The electric current is to be made to pass through the apparatus every morning, before the descent of the miners, and by putting a few pinches of sulphur on the gold wire every evening, many lives might be spared. Several members of the Academy spoke approvingly of the proposed plan, but all coincided in the opinion that regular and powerful means of ventilation could in no case be dispensed with in mines where choke-damp existed, and, moreover, that the combustion of explosive gases, by the means proposed, would of itself render ventilation necessary, as it would produce carbonic acid and oxide of carbon, one suffocating and the other poisonous.

Reclamation of Waste Lands.—A company commenced two years since the irrigation of a large tract of land, in what are called the Landes of the Pontlong, near Pau, in the Pyrénées, and a visit of the Emperor the other day has produced an account of the results obtained to the present time. Of the two thousand five hundred acres belonging to the company, one-half have this year produced fine crops of hay and grain, while the remainder are still covered with fern and reeds, intermixed with grass, which affords poor nourishment for cattle during only about two months in the year. It would be satisfactory to know at what expense and in what manner this important reclamation has been effected, for few countries are without waste land which requires some similar treatment.

Peat Lands and Forests on Fire.—Extraordinary accounts are given of the fires which have occurred between the Russian frontier, to the north-east of Prussia, and St. Petersburg. The whole country was said to be in flames for a distance of four hundred miles or more. The soil, which consists principally of a bed of peat, from twenty to forty feet in thickness, from the long drought, and the excessive heat of the summer, took fire, as the reports say, at ten thousand different points; the fire, which commenced beneath, soon reached the surface, and communicated itself to the forests. The air was so laden with smoke that numbers of persons had fallen down suffocated. Later accounts state that the fire spread towards the south, where also the forests were in flames. In several of the northern districts, where the forests are immense and almost impenetrable, there were from twenty to thirty thousand of acres in a state of incandescence. The absence of dates, names, and other particulars detract from the credibility of these reports, but the disaster seems very serious.

Correspondence.

Wages of the Agricultural Labourer.—Sir, I see by the Society's *Journal* of last week that you want to know the wages of labourers in Somerset. I beg to enclose a list of the wages paid in Glastonbury and the surrounding villages; but whether this may be taken as a fair specimen of the wages for the whole of Somerset I cannot say. I have gathered the figures from my pupils, who are farmers' sons, from the places named, so that they may be depended on as far as they go. In the hope that you may find the enclosed useful, I am, &c., Henry J. Taylor.

Glastonbury Collegiate School, Somerset, October 12, 1868.

Labourers.	Street.	Butleigh.	Walton.	West Pennard.	Glaston-bury.	Meare.	Godney.	Somerton.	Charlton Mackerel.
	s. d.	s. d.	s. d.	s. d.	s. d	s. d.	s. d.	s. d.	s. d.
Able-bodied ploughmen..	10 0	10 0	9 0	.. ..	10 0 to 12 0	9 0	10 0	10 0	10 0
Shepherds	9 0 and cottage	10 0	9 0	.. ..	.. ..	..	.. ..	10 0	10 0
Day labourers	8 0 and cottage	10 0	9 0	10 0	10 0	9 0	9 0	9 0	9 0
Women	6 0	4 6	4 6	5 0	.. ..	4 0	.. ..	5 0	—
Day labourers in harvest-time	12 0 food extra	11 0 food	10 0 food	.. ..	.. ..	food extra	.. ..	food extra	18 0 no food
Women in harvest time..	6 0	5 0	5 0	5 0	.. ..	food extra	.. ..	food extra	—
Ordinary prices of cutting and tying wheat per acre	7 6 to 10 0	.. ..	.. ..	.. ..	.. ..	8 0	.. ..	.. ..	7 0
Mowing clover per acre..	.. ..	.. ..	.. ..	.. ..	.. ..	3 0	—	—	—
Ordinary prices of mowing meadow grass per acre	3 0	3 6	3 6 to 4 0	3 0	3 6	3 0	mostly by machine	3 6	3 0

Rent of cottage, weekly or yearly:—Street, £4 to £6; Butleigh, £3 to £5; Meare, 1s. 6d. to 2s.; Somerton, 1s. to 2s.; Charlton Mackerel, £3 10s.

Perquisites:—Cider four pints per day; in harvest-time as much as the men want. Shepherds at Street have 6d. per lamb for all lambs reared more than number of ewes set.

MEETINGS FOR THE ENSUING WEEK.

MON. ..Society of Engineers, 7½. Discussion on paper "On the Screw Propeller." By Mr. Arthur Rigg, jun.

Patents.

From Commissioners of Patents' Journal, October 9.

GRANTS OF PROVISIONAL PROTECTION.

Advertising apparatus, for day or night, on land or afloat—2827—J. Hewes.
Anchors—2785—E. Padley.
Aniline black—2351—J. Higgin.
Axles, &c., metal for—2810—H. B. Woodcock.
Bale ties—2838—J. Edmondson.
Blinds for open vehicles—2771—S. Benjamin.
Boilers—2781—J. Shand.
Boilers, preventing accidents to—2915—W. Leatham.
Books, cutting the edges of—2847—J. Orrin and T. Geer.
Boots and shoes—2983—A. V. Newton.
Boots and shoes, scraping and cleaning—2840—R. Martin.
Boots and shoes, stretching and repairing—2887—J. Blakey.
Bottle stoppers, &c.—2763—A. R. Stocker and J. A. Edgley.
Bottles, capsuling—2857—W. Betts.
Bottling apparatus—2828—A. M. Clark.
Brushes, machinery for manufacturing—2815—W. R. Lake.
Buttons, apparatus for securing to articles of dress—2830—C. D. Abel.
Carding engines, condensers of—2730—C. Travis, J. Chadwick, and J. Law.
Casks, &c., self-acting tilts for—2801—I. Hudson.
Chandeliers, &c.—2987—E. Horton.
Coffee, &c., hulling and cleaning—2839—G. Davies.
Coffee-pots, &c.—2903—J. Lorkin.
Cooking stoves, gas—2834—C. de Bergue.
Crystals of soda, &c , utilising the alkaline salts, &c., contained in the weak alkali resulting from the manufacture of—2793—J. Oliver and C. O. McAllum.
Curtain rings—2841—A. Rooker.
Cylinders, &c., lubricating—2921—E. W. Halliday.
Discs having designs on their circumferences, moulds for casting—2985—L. Hannart and N. A. Aubertin, jun.
Dolls, &c., heads for—2859—W. R. Lake.
Electro-magnets—2854—A. M. Clark.
Electro-magnets—2951—E. Prévost.
Explosive compounds—2865—W. R. Lake.
Fire-arms, breech-loading—2744—T. Wilson.
Fire-grates—2855—G. B. Sharpe.
Float-valves of cisterns—2935—D. Cowan.
Fluids, machinery or apparatus for depurating—2881—W. Needham and J. Kite.
Fountains, ornamental—2901—N. Stevenson.
Furnaces—2811—C. Turner.
Fustians, &c., weaving and cutting—2975—J. Smith.
Gas—2585—J. Neumann.
Gas—2745—W. Tatlock and C. N. Abelseth.
Gas—2931—C. Hengst, H. Watson, J. B. Muschamp, and N. Wilson.
Gaseliers, gas pendents, brackets, and other gas fittings—2832—E. Sarjeant.
Gauze wire, annealing—2803—E. T. Hughes.
Girders, &c.—2797—O. C. Evans.
Grain, grinding—2823—J. D. Pinfold.
Grain, &c., treating—2711—H. Aitken.
Hats and caps—2829—E. Vickers.
Hats, &c.—2907—C. Vero.
Horses' shoes, &c.—2807—J. Roberts.
Hydraulic and other presses—2939—W. T. Watts and D. J. Fleetwood.
Iron and steel—2310—J. Bowron and G. Lunge.
Lathes, &c., gearing for—2957—J. Heap.
Liquid fuel, &c.—2869—J. H. Johnson.
Locomotive engines and carriages for railways—2909—F. W. Fox.
Looms—2848—J. Horrocks.
Looms—2937—C. Catlow.
Looms—2989—W. Gadd and J. Moore.
Meat, fowls, fish, eggs, &c., preserving—2846—C. Havard and M. X. Harmony.
Medicinal purposes, &c., purifying and supplying vapours for—2867—G. H. Barth.
Metallic plates or blocks—2819—C. E. Brooman.
Motive-power apparatus—2637—C. J. R. Jähns.
Musical instruments, wind—2943—J. L. R. Steckel.
Oakum, &c., apparatus for manufacturing—2895—N. Jarvie and W. Miller.
Omnibuses, &c., tell-tales for—2371—J. Onions.
Ovens, bakers'—2899—W. C. Woodcock.
Paste and card board—2961—J. Jones and G. E. Wilkinson.
Pianofortes—2850—G. R. Samson.
Ploughs—2860—T. Beards.
Ploughs—2861—J. Davey.
Ploughs—2973—J. Robinson.
Pneumatic apparatus—2929—A. M. Wier and M. A. Wier.
Potato-planting machines—2879—E. Templehoff.
Pumping apparatus—2933—E. Death and J. Ellwood.
Punching machines—2845—R. Hodson.
Railway tickets, cases for holding—2853—J. de Masy.
Railway trains, communication between passengers and guards, &c., in—2851—J. Walmsley.
Rock, &c., boring—2965—F. B. Dœring.
Safety-lamps—2891—L. Desens.
Safety-valves—2897—G. Sanders.
Screw propellers—2877—H. Vansittart.
Screwing bolts, &c., stocks and dies for—1739—W. Adkins.
Sewage, &c., treating—2883—W. H. Hughan.
Sewing machines—2925—A. Booth and J. Harrison.
Ships' bottoms, &c., preventing the fouling of—2871—R. Smith.
Ships, iron, preserving and keeping clean the bottoms of—2825—H. J. Turnbull.
Ships, propelling, &c.—2991—V. Juge.
Ships, &c., fixing armour-plates to—2905—J. Kirk and J. Batstone.
Ships, &c., registering the speed of—2913—C. E. Brooman.
Smoke, preventing, and regulating the supply of air to furnaces—2967—J. Shepherd.
Spoons, &c.—2783—T. Bennett.
Stamps, adhesive—2947—W. E. Newton.
Steam engines, condensing apparatus for—2795—W. R. Lake.
Steam pumping machinery—2831—M. Benson.
Steel, cast—2963—V. Gallet.
Sweeping machines, &c.—2835—F. Brady.
Swimming apparatus—2977—W. E. Gedge.
Tea, apparatus for sifting, cutting, and mixing—2799—W. Thompson.
Tea-plant, &c., treating the leaves of the—2893—B. Dickinson.
Timekeepers, mechanical, for recording the time when workmen come to or leave their employment—2949—W. J. Ledward.
Tools—2206—A. Munro and W. B. Adamson.
Toys representing game-cocks, &c., in the act of fighting—2833—H. Jewitt.
Travelling bags, writing cases, &c., fastenings and locks for—2843—E. Heusser.
Vessels, annealing raised hollow—2862—W. T. Watts.
Walls, &c., covering for—2842—W. R. Lake.
Warping mills and hecks—2955—J. Sutcliffe.
Water, raising—2993—J. Lambert.
Water, &c., raising—2863—W. E. Newton.
Weighing and lifting apparatus—2809—M. Henry.
Weighing machines—2852—H. Marrian.
Wells and pumps—2813—F. Warner.
Wire fences, constructing, and apparatus used therein—2873—J. Head.
Wire webs and strainer plates, preserving from corrosion—2844—W. Durham.
Wool, preparing for felting—2917—T. Lucas and W. Grimshaw.
Wringing machines—2875—T. E. Hughes.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Fabrics, pile—3007—G. T. Bousfield.

PATENTS SEALED.

1205. C. Martin, W. Barrett, and T. H. Webb.
1210. G. Clark.
1213. A. Woodcock.
1218. B. J. B. Mills.
1219. J. Rothery.
1221. T. F. Shillington.
1227. T. Smith, T. Wood, and T. Don.
1233. M. P. W. Boulton.
1237. G. Glover.
1238. E. Page.
1240. R. Oxland.
1242. R. Boby.
1248. R. Weir and J. Gray.
1249. H. S. Evans.
1251. J. Robinson.
1254. G. D. Kittoe & P. Brotherhood.
1278. C. D. Abel.
1288. A. V. Newton.
1291. A. Cole and J. Carter.
1316. W. R. Lake.
1325. T. Hardcastle.
1346. D. C. Lowber.
1350. W. H. Ryland.
1373. D. Geraci.
1374. V. Delperdange.
1382. E. McDonnell.
1402. J. McKean & J. Stenhouse.
1403. H. Deacon.
1420. W. R. Lake.
1537. W. R. Lake.
1590. H. C. Crofts.
1637. D. A. Cooper.
1678. J. Starley.
1680. W. E. Newton.
1750. M. Gray.
1759. W. E. Newton.
1893. W. F. Proctor.
1900. C. R. E. Grubb.
1928. W. R. Lake.
2286. T. Kohn.
2319. J. Purdey.
2424. R. G. Hatfield.
2394. J. Rawsthorn.
2530. F. Barnett.
2534. I. M. Milbank.

From Commissioners of Patents' Journal, October 13.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2593. J. Homan.
2594. J. Homan.
2615. J. J. Parkes.
2636. W. Mather.
2568. H. F. Smith.
2621. M. Henry.
2647. W. Robertson and J. G. Orchar.
2652. J. Tangye.
2693. J. Taylor, jun.
2787. J. and J. Hinks.
2626. J. Linton.
2628. J. H. Selwyn.
2627. V. A. and V. J. Messinger.
2630. A. A. Lerenard.
2669. H. Skinner.
2765. W. Smith.
2776. T. B. Jordon.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2499. A. Chaplin.
2535. J. Downs.
2568. J. Gilbert.